

REMARKS

Reconsideration and allowance of the above-identified Application in view of the above amendments and the following remarks are respectfully requested.

Claims 1, 3-9, 17-19 and 21-30 are pending in the Application. Claims 1, 5, 6, 9 and 17 have been amended herein.

Claim Rejections – 35 USC § 102

Claims 1, 3-9, 17-19 and 21-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ivankovits et al. (U.S. Patent No. 5,213,621) in combination with Nguyen et al. (US 2001/0009154A1) and Senzaki et al. (U.S. Patent No. 6,090,960). Applicants respectfully traverse this rejection for at least the following reasons.

Claim 1 has been amended to recite, *inter-alia*, “A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and one of the first pipe and the second pipe, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising: forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber...”

Claim 9 has been amended to recite, *inter-alia*, “A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and one of the first pipe and the second pipe, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising: forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber;...”

Claim 17 has been amended to recite, *inter-alia*, “A method of cleaning a treatment apparatus including a chamber, a susceptor in the chamber, a first tank of a treatment agent, a

vaporizer to vaporize the treatment agent, a first pipe connecting the first tank and the vaporizer, a second pipe connecting the vaporizer and a first opening of the chamber, the second pipe supplying the vaporized treatment agent into the chamber, a second tank of a cleaning agent, a third pipe connecting the second tank and one of the first pipe and the second pipe, a vacuum pump, and a forth pipe connecting the vacuum pump and a second opening of the chamber to evacuate an atmosphere from the chamber, the method comprising: forming a material including copper on a wall inside the chamber of the treatment apparatus by supplying the vaporized treatment agent into the chamber...” By using the method of claim 1, the method of claim 9 or the method of claim 17, the material including the metal (for example, copper) on the wall inside the chamber can be removed efficiently. As a result, the wall inside the chamber is cleaned.

Ivankovits et al. discloses a process for cleaning metal-containing contaminants from a surface of a substrate of the type used in fabricating integrated circuits and semiconductors by using a cleaning agent, for example trifluoroacetic acid. Ivankovits et al. is not concerned about cleaning a treatment apparatus including a chamber but merely concerned about cleaning a surface of a substrate.

The Examiner concedes that Ivankovits et al. does not teach cleaning a treatment chamber including a wall of the chamber, does not teach heating a wall inside a process chamber, does not teach the repeating and confirming and does not teach the copper material. Furthermore, Ivankovits et al. does not disclose, teach or suggest forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying a vaporized treatment agent into the chamber, as recited in claims 1, 9 and 17. Ivankovits et al. simply contacts the surface to be cleaned with a cleaning agent to form volatile metal-ligand complexes on the surface of the substrate which are then sublimed (see the abstract in Ivankovits et al.). Clearly, Ivankovits et al. does not form a material including a metal on a wall inside the chamber.

Nguyen et al. fails to cure the deficiencies noted above in Ivankovits et al. Nguyen et al. discloses a method of cleaning interior surfaces of a metal vapor deposition chamber. The method of Nguyen et al. first oxidizes the surface to be cleaned with oxygen plasma and then removes the oxide products by using hydrolyzed hexafluoroacetylacetone (Hhfac) to volatilize the oxide products (see the abstract in Nguyen et al.). Nguyen et al. does not disclose, teach or suggest using a cleaning agent comprising one of a carboxylic acid and a derivative of carboxylic acid. Furthermore, Nguyen et al. does not disclose, teach or suggest

forming a material including a metal on a wall inside the chamber of the treatment apparatus by supplying a vaporized treatment agent into the chamber. Nguyen et al. simply uses an oxygen plasma to oxidize a surface of the chamber and does not form a material on a wall inside the chamber.

Moreover, there is no suggestion or motivation in Ivankovits et al. to clean a chamber because Ivankovits is merely directed to cleaning a substrate. Similarly, there is no suggestion or motivation in Nguyen et al. to use the process of Ivankovits et al. to clean the chemical vapor deposition equipment of Nguyen et al. because the method of cleaning of Nguyen et al. uses a plasma of oxygen for oxidation followed by a Hhfac reaction to volatilize the oxide products and the method of Nguyen et al. is completely different from the process of Ivankovits et al. Furthermore, even if one were to combine the teachings of Ivankovits et al. with the teachings of Nguyen et al., which Applicants do not concede would be contemplated by one skilled in the art, the combination would not lead to a method of cleaning a treatment apparatus as recited in claims 1, 9 and 17 as both Ivankovits et al. and Nguyen et al. fail to disclose, teach or suggest “forming a material including a metal on a wall inside the chamber of the treatment apparatus...” Consequently, neither Ivankovits et al. nor Nguyen et al., alone or in combination, disclose, teach or suggest the subject matter recited in claims 1, 9 and 17.

Senzaki et al. fails to cure the deficiencies noted above in Ivankovits et al. and Nguyen et al. Senzaki et al. merely discloses a method of applying chemical vapor deposition copper to integrated circuit substrates. Senzaki et al. does not disclose, teach or suggest “forming a material including a metal on a wall inside the chamber of the treatment apparatus...” Consequently, none of Ivankovits et al., Nguyen et al. and Senzaki et al., alone or in combination disclose, teach or suggest the subject matter recited in claims 1, 9 and 17.

Therefore, for at least these reasons, Applicants respectfully submit that claims 1, 9 and 17, and claims 3-8, 18, 19 and 21-30 which depend from either claim 1, claim 9 or claim 17, are patentable. Therefore, Applicants respectfully request that the rejection of claims 1, 3-9, 17-19 and 21-30 under § 103(a) over the combination of Ivankovits et al., Nguyen et al. and Senzaki et al. be withdrawn.

CONCLUSION

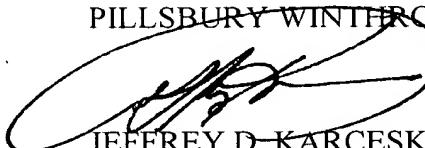
In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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